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Dercum (F. X.)

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***SOME THOUGHTS ON SURGICAL SHOCK, WITH
SPECIAL REFERENCE TO BRAIN AND
SPINAL OPERATIONS.***

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THE writer has had the opportunity of witnessing many of the remarkable brain and spinal operations lately performed in Philadelphia, and the following thoughts have arisen as a result of this experience. It is not intended to encroach upon the field belonging properly to the surgeon, but merely to make a few suggestions that may possibly be of value in the desperate cases occasionally submitted to the knife.

Observation shows that operations upon the cerebrum, the cerebellum, and the cord are, as a rule, attended by the most profound shock. Evidently this shock is the greatest danger which the surgeon has to meet. Indeed, in the various fatal cases which the writer has seen, it was the chief, if not the only, cause of death. It is so formidable that every resource at our command should be exhausted to meet it; nothing should be neglected. In some cases a hair might turn the scale, and it is for this reason that the following suggestions are made.

With regard to the special preparation of the patient the judgment and experience of the surgeon should be deferred to. I should like, however, to



direct attention to a point the value of which was long ago recognized by Travers¹ and which was more recently reiterated by Jordan.² It is to place the patient in a condition of rest and quiet by putting him to bed for several days or a week before the operation. This method appears to me to be of really great value. Certainly it promises to diminish the general nervousness and irritability of the patient. It promises to calm and steady and to improve all of the various functions. While it soothes, it at the same time elevates the general level of vitality and in a measure simulates a brief course of rest-cure.

Further, by being in bed the patient gradually becomes accustomed to the idea of being sick. Even the thought of the operation becomes more and more familiar, and, under the toning influence of a properly trained nurse, loses more than half its terrors. Again, these preliminaries give abundant opportunity for a cheerful acquaintance with the surgeon and permit a grateful confidence to spring up in the heart of the patient. By this means, the psychic element of shock, so potent for ill, and which, I fear, frequently receives too little consideration, may be largely diminished.

According to circumstances, the rest-cure may be still further simulated by the addition of massage and even of faradism. Forced feeding to within twenty-four or forty-eight hours of the operation may also be carried out. Strict isolation is, of course, uncalled for, but emotional friends and relatives should be excluded. No one should be permitted

¹ Travers: Constitutional Irritation, 1827.

² Jordan: Hastings' essay, on Shock.

to see the patient unless by the consent of the doctor or a responsible nurse. To patients who have been for some time bedridden, and to those in whom from the very nature of their affection the general nervous tone has become much depressed, these suggestions are especially applicable.

Turning now to the immediate prophylaxis of shock, it has occurred to me that the hypodermatic injection of strychnia just before the operation would be of value. I am not aware that this use of strychnia has thus far been advocated. To some extent, but much less than it should be, it has been used in the treatment of the fully established shock. Evidently if shock be due, as there is every reason to believe, to a more or less marked general paralysis of the nervous system, strychnia is strongly indicated. It is its use as a prophylactic to which I especially desire to call attention.

I would suggest that it be used somewhat as follows: According to the nature of the operation, one twentieth to one-tenth of a grain of the sulphate should be injected just as full etherization is reached. Should the operation be excessively prolonged or should shock of great intensity be developed, the dose should be repeated. Its use subsequent to the operation must be governed by the condition of the patient and by the amount already administered.

There can be no doubt that a tolerance to the action of strychnia is to some extent established in shock and that relatively massive doses will be well borne. I should regard one-fifth or one-fourth of a grain in divided doses distributed over several hours as perfectly safe. It is not improbable that in very profound shock even more might be borne.

Its use and its dose previous to the operation must, of course, depend upon the character and probable extent of the latter. In relatively simple procedures it may very properly be omitted, and, if necessary, administered during, or subsequent to, the operation, as the indications arise. For instance, its use is not strongly indicated in interference with the cortex in the frontal or motor regions; provided, of course, that the interference be not too extensive. Observation inclines me to the view that the shock following operations upon the cerebro-spinal axis deepens as we go from the frontal regions of the brain backward to the occipital lobes; further, that it is still deeper in the cerebellum, and reaches its acme of intensity in the cord. If this be true, a ready rule is furnished not only for the use but also for the dosage of strychnia.

It is difficult, finally, to conceive of any condition in which it could possibly be of harm, and only in positively reckless hands could there be any danger whatever.

With regard to the matter of etherization, there can be no doubt that the too free administration of ether is not infrequently harmful and it is very probable that it occasionally plays no insignificant part in the collapse of the patient. The rule that only the minimum quantity of ether necessary to produce and maintain anæsthesia should be used, is to be observed with all possible strictness. In a desperate case this may be one of the apparently unimportant measures that may determine the successful issue, and if possible the services of some one especially skilled in the administration of anæsthetics should be secured.

Passing now to the management of the fully established shock we think at once, in addition to strychnia, of the various cardiac stimulants, alcohol, digitalis, and ammonia. With regard to the use of these drugs I shall have but little to say, as I have elsewhere¹ considered them to some extent.

Alcohol is, of course, of the greatest value, but, as a rule, the patient is nauseated after the operation and unable to retain it, even when mixed with carbonated water or administered in the form of champagne. Hypodermatically it must give way in point of value to digitalis.

If the symptoms of heart failure be at all pronounced, digitalis should be given, and in doses large enough and repeated with sufficient frequency to produce an appreciable effect on the pulse. As in the case of strychnia, there is established in profound shock a tolerance of digitalis so that the latter may be administered in quite large doses. A half drachm of the tincture every half-hour has been given for four hours with the result of saving life.² Hypodermatically, ten to fifteen minims should be given, repeated every twenty minutes, until some response is detected in the pulse.

Of ammonia as a remedy in shock I entertain but a poor opinion. Its action is altogether too fleeting, and if used at all it should only be as an adjuvant to the other remedies.

There is, however, one drug that, judging from every indication, should be of especial value, and

¹ Railroad Shock and its Treatment. Annual address before the Lehigh Valley Medical Society, Aug. 16, 1889. *Therapeutic Gazette*. (In press.)

² Lauder Brunton: Shock and Syncope: the case of Wilkes.

which, strange to say, is almost unappreciated. It certainly is by far too little resorted to. I speak of musk. Musk—that is, the genuine drug—is not readily obtained and is very expensive, but there is no other drug that promises so much. It acts as a gentle and sustaining stimulant to the nerve centres. It calms and steadies. It quiets the restlessness of the patient, allays the vomiting, and arrests the distressing hiccough. It should be administered after the manner recommended by Dr. H. C. Wood—namely, suspended in a little thin mucilage and by the rectum. In shock; of course, the dose should be relatively large, say fifteen to twenty grains; and a little laudanum, say fifteen drops, may be added with advantage. Opium in full doses, however, should rather be avoided, even in extreme restlessness, as there is good reason to believe that in shock the resistance to opium is much diminished. Exceptionally its use may be counselled, but never without risk.

Another remedy of undoubted usefulness in shock is atropia. As well known, it is a respiratory stimulant and also a stimulant to the vaso-motor nerve centres in general. The patient is, as a rule, bathed in a profuse and exhausting sweat, and in such a case atropia is especially indicated. One-sixtieth of a grain should be given, and repeated, if at all, in diminished dose and at relatively long intervals.

However, one of the most striking and most dangerous symptoms of shock still remains to be combated, and that is, the fall of temperature. The moment we touch the patient we realize how very cold he is—cold and damp. It is always very marked; sometimes the temperature falls as low as

95°. ¹ Application of external heat is of the utmost consequence. However, the amount of good accomplished by such appliances as cans and bottles of hot water is very limited. Their action is confined to but small extents of surface, and the effect on the body temperature as a whole is very meagre. The hot bath, which may be resorted to in desperate cases, is very objectionable; first, because it necessitates a large amount of handling of the patient; secondly, because in some cases it may interfere with the dressings; and lastly, because the heat applied is moist and not dry heat. It is preëminently necessary that the heat should be *dry* heat, and the problem arises: By what means can dry heat be applied to a large extent of surface and without inconvenience to the patient?

Some time ago I was called to a patient in collapse during an attack of pleurisy. The temperature had fallen to 96.5° and the general condition was alarming. ² I at once procured an ordinary hospital water-bed, such as is used for fractures and dislocations of the spine. It was filled with hot water, covered by several layers of flannel blankets, and the patient placed upon it. In a short time reaction set in, and the temperature rose to a little above normal. The result was, indeed, gratifying in the extreme. Certainly no other method promises to yield such excellent and immediate results, and, it seems to me, that in desperate surgical procedures in which profound shock may be expected, the hot-water bed should be kept in readiness and the patient placed upon it as soon as the operation

¹ Cheever: Boston Med. and Surg. Journal, 1888, cxix. 293.

² Also mentioned in address before referred to. Loc. cit.

has been completed. Should it be too hot, extra layers of blankets may be first applied. With care, however, and the exercise of a little judgment, a proper temperature may easily be obtained.

Let us suppose, now, that the surgeon is about to perform a serious operation, say trephining of the spinal canal with possible opening up of the dura. How shall he proceed? Let us rehearse a moment the steps that he would take. First, the preliminary rest should be undertaken according to circumstances, as pointed out; secondly, excessive care is to be used in the administration of ether; thirdly, etherization being complete, one-tenth of a grain of strychnia is to be injected hypodermatically, and repeated, if necessary, in the manner suggested; fourthly, the operation being complete, and the shock established, the patient is to be at once transferred to the previously prepared hot-water bed, the head being maintained a little lower than the body. Shock continuing unabated, digitalis and atropia are next to be used hypodermatically, and at the same time musk is to be injected, as suggested, into the bowel. If the latter is not to be obtained, warm strong black coffee is to be used in its stead.

The hypodermatic injection of ether I do not believe to possess much utility. If it acts at all, it must be in a reflex way by the local irritation it produces.

The above thoughts are expressed with all deference to the experience of surgeons, and are thrown out merely as suggestions. Should they result in increasing the percentage of recoveries by ever so small an amount, the writer will feel amply repaid.